



# The Catalyst

Volume 2 Number 1

Summer 1996

A Newsletter of the Research & Development Unit

## Recent Research Projects

Number, Title, Principal Investigator/Contact, Status

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|------|---|------|--|
| 87-1 | A Comparative Study Of Performance Of Different Designs For Flexible Pavements, N. Paul Khosla/Moy Biswas, In Progress.   | 92-3 | Safety Effectiveness Procedures For North Carolina's 3R Design Guide, C.V. Zegeer/Pat Strong, Complete.  |
| 90-1 | Weed Control Management Plan For Wildflower Plant Beds, Walter A. Skroch/Pat Strong, Complete.  | 93-1 | Determination Of A Minimum Highway Pavement Marking Retroreflectivity Value For Older Drivers, Johnny R. Graham/Mike Stanley, Complete.        |
| 90-2 | Evaluation Of Chemical And Structural Properties Of Portland Cement Concrete Made With Marine Limestone Coarse Aggregates, Mrinmay Biswas/Pat Strong, Complete. | 93-2 | Direct Evaluation Of Corrosion Potential In Concrete Made With Marine Limestone Coarse Aggregates, Mrinmay Biswas/Pat Strong, Complete.        |
| 90-3 | Large Size Asphaltic Concrete Mixtures—A Design Approach And Performance Evaluation, Paul Khosla/Moy Biswas, Complete.  | 93-3 | Cracking In Large-Sized Long-Span Prestressed Concrete AASHTO Girders, Paul Zia/Moy Biswas, Complete.  |
| 90-4 | A Study Of Stiffness And Strength Characteristics Of Subgrade Soils Blended With Aggregate, Phillip C. Lambe/Moy Biswas, Complete.                              | 93-4 | Verification Of Analytical Model For Tensioning Of Draped Strands For Prestressed Concrete Girders, Paul Zia/Moy Biswas, Complete.             |
| 90-5 | Forecasting Service Life Of Culverts In North Carolina, H. Rooney Malcom/Mike Stanley, Complete.  | 93-5 | Stone Mastic Asphalt Mixture Study For Bituminous Concrete Courses - A Design And Performance Evaluation, N. Paul Khosla/Moy Biswas, Complete. |
| 90-6 | Analysis Of Relationships Affecting Bridge Deterioration And Improvement, David W. Johnston/Pat Strong, Complete.   | 93-6 | Asphalt Paving Material Properties Affected By Temperature, Richard Kim/Moy Biswas, Complete.  |
| 91-1 | Ground Rubber Use In Asphalt Pavement Mixture, N. Paul Khosla/Moy Biswas, Complete.   | 93-7 | Construction Induced Vibrations, Roy H. Borden/Moy Biswas, Complete.   |
| 91-2 | Development Of A Methodology For An IVHS Demonstration Project, David T. Hartgen/Pat Strong, Complete.  | 93-8 | Bridge Maintenance Level Of Service Optimization, David W. Johnson/Pat Strong, Complete.   |
| 92-2 | Determining The Length Of Installed Timber Pilings By Dispersive Wave Propagation Methods, R.A. Douglas/Pat Strong, Complete.                                   | 93-9 | Unconventional Design And Operation Strategies For Over-Saturated Major Suburban Arterials, J.E. Hummer/Mike Stanley, Complete.                |

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| <p>94-1 <i>Minimum Highway Sign Luminance Requirements For Older Drivers</i>, Ellis King/Mike Stanley, <i>Complete</i>.</p> <p>94-10 <i>Development And Testing Of Technologies To Protect Against Crane Boom And Turret Drive Failures</i>, Leonhard E. Bernold/Mike Stanley, <i>Complete</i>.</p> <p>94-2 <i>Intersection Design Decision/Reaction Time For Older Drivers</i>, Johnny R. Graham/Mike Stanley, <i>Complete</i>.</p> <p>94-3 <i>Automation In Applying Reflective Pavement Markers</i>, Leonhard E. Bernold/Mike Stanley, <i>Complete</i>.</p> <p>94-4 <i>Jointless Bridge Decks</i>, Paul Zia/Mike Stanley, <i>Complete</i>.</p> <p>94-5 <i>Development Of High Early Strength Concrete For Prestressed Concrete Applications</i>, Paul Zia/Moy Biswas, <i>Complete</i>.</p> <p>94-6 <i>Investigation Of Alkali-Silica Reactivity In North Carolina Department Of Transportation Structures</i>, M.L. Leming/Moy Biswas, <i>In Progress</i>.</p> <p>94-7 <i>Use Of Large Stone Asphaltic Concrete On Overlays Of Flexible Pavements</i>, Paul Khosla/Moy Biswas, <i>In Progress</i>.</p> <p>94-8 <i>Capacity And Delay In Major Freeway Construction Zones</i>, J.E. Hummer/Mike Stanley, <i>Complete</i>.</p> <p>94-9 <i>NCDOT Equipment Management Information Systems Study</i>, Robert W. Attaway/Pat Strong, <i>Complete</i>.</p> <p>95-1 <i>Statewide Calibration Of Asphalt Temperature Study From 1992 And 1993</i>, Richard Kim/Moy Biswas, <i>In Progress</i>.</p> <p>95-2 <i>Applicability Of SHRP Binder Testing Protocol And Superpave PG Binder Specifications To Asphalt Cements Containing Modifiers</i>, Akhtar Tayebali/Moy Biswas, <i>In Progress</i>.</p> <p>95-3 <i>Robotics Systems For Bridge Maintenance</i>, Leonard Bernold/Mike Stanley, <i>In Progress</i>.</p> | <p>95-4 <i>Procedure For Establishing No Passing Zones</i>, J.E. Hummer/Mike Stanley, <i>Complete</i>.</p> <p>95-5 <i>Construction Related Vibrations: Field Verification Of A Vibration Induced Settlement Model</i>, Roy H. Borden/Moy Biswas, <i>Complete</i>.</p> <p>95-7 <i>Determination Of Effects Of Fine Content From Crushed Concrete</i>, S.H. Ahmad/Moy Biswas, <i>In Progress</i>.</p> <p>95-8 <i>Design And Evaluation Of Cold-Mix Recycled Pavements</i>, Paul Khosla/Moy Biswas, <i>In Progress</i>.</p> <p>96-1 <i>Remote Sensing Of Mobile Source Air Pollutant Emissions</i>, H. Christopher Frey/Pat Strong, <i>In Progress</i>.</p> <p>96-2 <i>Laboratory Investigation Of Alkali-Silica Reactivity</i>, S.H. Ahmad/Moy Biswas, <i>In Progress</i>.</p> <p>96-3 <i>Level Of Service Assessment For Congested Freeway Sections In North Carolina</i>, Gary S. Spring/Pat Strong, <i>In Progress</i>.</p> <p>96-4 <i>Using Advanced Vehicle Monitoring Systems To Extend System Capacity Along North Carolina Freeways</i>, Nagui M. Rouphail/Mike Stanley, <i>In Progress</i>.</p> <p>96-5 <i>Interpretation Of Falling Weight Deflectometer Data When Pavement Layers Are Not Intact</i>, Richard Kim/Moy Biswas, <i>In Progress</i>.</p> <p>97-1 <i>Operational Capacity of Three-Lane Cross Section</i>, J.E. Hummer/Pat Strong, <i>New</i>.</p> <p>97-2 <i>Field Assessment of the Performance of Signal Timing Models of Individual Intersections In North Carolina</i>, Nagui Rouphail/Mike Stanley, <i>New</i>.</p> <p>97-4 <i>Investigation of Differences of Alkali-Silica Reactivity of Two North Carolina Bridges</i>, M.L. Leming/Moy Biswas, <i>New</i>.</p> <p>97-5 <i>Low Maintenance Turfgrass and Management Systems for North Carolina Roadsides</i>, Arthur Bruneau/Mike Stanley, <i>New</i>.</p> <p>97-6 <i>Boundary Conditions for Bridge Scour Analysis</i>, M.F. Overton/Mike Stanley, <i>New</i>.</p> |
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- 170-3(2) *Watertight Bridge Expansion Joints*, Mike Stanley, *In Progress*.
- 170-3(10) *Accident Performance Of Selected Impact Attenuation Devices*, Mike Stanley, *Complete*.
- 170-3(15) *In-Place Performance Of Prefabricated Drainage Panel Adjacent To Bridge Substructure Elements*, Mike Stanley, *Complete*.
- 170-3(16) *Evaluation Of The Centre Guardrail Anchor System*, Mike Stanley, *Complete*.
- 170-3(17) *Performance Evaluation Of 3M Stamark A350 Series Pavement Marking Tape*, Robert Attaway/Mike Stanley, *Complete*.
- 170-3(18) *In-Service Performance Of The Quickchange Movable Concrete Barrier System*, Mike Stanley, *In Progress*.
- 170-3(19) *Evaluation Of A Four Year Performance Specification For Retroreflective Pavement Marking Materials*, Mike Stanley, *Complete*.
- 170-3(20) *Evaluation Of An Epoxy Urethane Bridge Deck Overlay*, Mike Stanley, *Complete*.
- 170-3(21) *Evaluation Of A Latex Modified Asphalt Emulsion Paving System*, Mike Stanley, *Complete*.
- 170-3(23) *Airborne Kinematic GPS Photogrammetry And Its Potential Application For Large Scale Photogrammetric Mapping*, Keith Johnston/Mike Stanley, *Complete*.
- 170-3(24) *Evaluation Of Anti-Graffiti Coating*, Mike Stanley, *Complete*.
- 170-3(25) *Evaluation Of A Galvanic Anode System For Bridge Piles—Construction Report*, Mike Stanley, *In Progress*.
- 170-3(26) *Use Of Recycled/Recyclable Materials In Highway Construction*, Moy Biswas, *In Progress*.
- 170-3(27) *Evaluation Of Soil Confinement System For Slope Stabilization*, Mike Stanley, *Complete*.

- 170-3(28) *Construction and Performance Evaluation Of The Insteel 3-D Noise Barrier*, Mike Stanley, *In Progress*.
- 170-3(31) *Epoxy-Coated Prestressing Strands In Cored Slab Construction*, Moy Biswas, *In Progress*.
- 170-3(32) *Performance of Modified and Unmodified Asphalt*, Moy Biswas, *In Progress*.
- 170-3(33) *Use of Laminated Veneer Lumber For Breakaway Sign Supports*, Mike Stanley, *In Progress*.
- 170-3(34) *Use of Cable Guardrail As A Median Barrier*, Mike Stanley, *In Progress*.
- 170-3(35) *Video Surveillance System—Vehicle Monitoring At Railroad Grade Crossings*, Adam Mastrangelo/Mike Stanley, *In Progress*.
- 170-3(36) *Deployment Of A Water-Filled Barrier in Freeway Work Zones*, Mike Stanley, *In Progress*.
- 170-3(37) *Field Evaluation of Tex-Cote XL-70 Bridge Cote System*, Moy Biswas, *In Progress*.
- Field Evaluation of Silane Bridge Protection Coatings*, Moy Biswas, *In Progress*.
- Field Evaluation of AT&T Smart Sonic™ Traffic Surveillance Sensor*, Mike Stanley, *In Progress*.



## Project Contacts

Pat Strong	(919) 715-2464
Mike Stanley	(919) 715-2463
Moy Biswas	(919) 715-2465
Fax Number	(919) 715-0137

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*The Catalyst*, the newsletter of the Research and Development Unit of the North Carolina Department of Transportation, is an effort to expand the outreach of the Division of Highways interdisciplinary research activities and to enhance the technology transfer process. With the emphasis on applied research as promoted in the 1991 Intermodal Surface Transportation Efficiency Act legislation and with the new directions that surface transportation appears to be headed during the 1990's, the maximization of all research, development and technology transfer results in

the Division of Highways is very important. Effective July 1, 1995, the Division of Highways began utilizing a management system for its research and development program. One of the essential requirements for this management system is to improve efforts to track activities, schedules and accomplishments. Reader feedback concerning any newsletter article is strongly encouraged.

Research report copies covering the various contract research studies may be obtained from Ms. Portia McLean by calling (919)-715-2461.

## *The Catalyst*

Research and Development Unit  
North Carolina Department of Transportation  
P.O. Box 25201  
Raleigh, North Carolina 27611-5201